

WHAT IS CLAIMED IS:

1. An article of manufacture that is comprised of a soft thermoplastic elastomer composition overmolded onto a hard substrate wherein the soft thermoplastic composition is comprised of (a) a thermoplastic resin selected from the group consisting of polyolefin resins, polyphenylene ether, and polystyrene, wherein the thermoplastic resin is present at a level of up to 60 parts by weight (b) 5 to 90 parts by weight of a rubbery elastomer that is comprised of repeat units that are derived from a conjugated diene monomer selected from 1,3-butadiene and isoprene, wherein the rubbery elastomer is optionally at least partially crosslinked, wherein the repeat units in the rubbery polymer are distributed throughout the rubbery polymer in an essentially random manner, and wherein the rubbery polymer is a solution polymer, (c) 5 to 90 parts by weight of a highly saturated elastomer selected from the group consisting of styrene-ethylene butylene-styrene polymers, styrene-ethylene propylene-styrene polymers, hydrogenated polybutadiene, hydrogenated polyisoprene, hydrogenated styrene-isoprene random copolymers, hydrogenated styrene-isoprene block copolymers, hydrogenated styrene-butadiene random copolymers, hydrogenated styrene-butadiene block copolymers, and (d) 15 to 600 parts by weight of an oil.
2. A process for manufacturing an article of manufacture that comprises (1) melt blending (a) a thermoplastic resin selected from the group consisting of polyolefin resins, polyphenylene ether, and polystyrene, wherein the thermoplastic resin is present at a level of up to 60 parts by weight, (b) 5 to 90 parts of a rubbery elastomer that is comprised of repeat resin units that are derived from a conjugated diene monomer selected from 1,3-butadiene and isoprene, wherein the rubbery elastomer is optionally at least partially crosslinked, wherein the repeat units in the rubbery polymer are distributed throughout the rubbery polymer in an essentially random manner, and wherein the rubbery polymer is a solution polymer, (c) 5 to 90 parts of a highly saturated elastomer selected from the group consisting of styrene-ethylene butylene-styrene polymers, styrene-ethylene propylene-styrene polymers, hydrogenated polybutadiene, hydrogenated polyisoprene, hydrogenated styrene-isoprene random copolymers, hydrogenated styrene-isoprene block copolymers, hydrogenated styrene-butadiene random copolymers, hydrogenated styrene-butadiene block copolymers, and (d) a

crosslinking agent to produce a soft thermoplastic composition, wherein the melt blending is conducted above the melt point of the thermoplastic resin, and wherein the crosslinking of the rubbery elastomer is conducted in a continuous mixer; (2) pelletizing the soft thermoplastic elastomer composition as it is being discharged from the mixer, (3) 5 overmolding the soft thermoplastic elastomer composition onto a hard substrate to produce the article of manufacture.

3 A thermoplastic elastomer composition which is comprised of (a) a thermoplastic resin selected from the group consisting of polyolefin resin, polyphenylene 10 ether, and polystyrene, wherein the thermoplastic resin is present at a level of up to 60 parts by weight, (b) 5 to 90 parts by weight of a rubbery elastomer that is comprised of repeat units that are derived from a conjugated diene monomer selected from 1,3-butadiene and isoprene, wherein the repeat units in the rubbery polymer are distributed through the rubbery polymer in an essentially random manner, wherein the rubbery 15 polymer is a solution polymer, and is optionally, at least partially crosslinked, (c) 5 to 90 parts by weight of a highly saturated elastomer selected from the group consisting of styrene-ethylene butylene-styrene, styrene-ethylene propylene-styrene, hydrogenated polybutadiene, hydrogenated polyisoprene, hydrogenated styrene-isoprene random copolymers, hydrogenated styrene-isoprene block copolymers, hydrogenated styrene- 20 butadiene random copolymers, hydrogenated styrene-butadiene block copolymers, hydrogenated styrene-isoprene block copolymers, and hydrogenated styrene-isoprene/butadiene-styrene block copolymer, and (d) 15 to 600 parts by weight of an oil.

4. A thermoplastic elastomer composition as specified in claim 3 wherein 25 the thermoplastic resin is a continuous matrix phase, wherein the rubbery elastomer is a dispersed phase, and wherein the highly saturated elastomer is a dispersed phase.

5. A thermoplastic elastomer composition as specified in claim 3 wherein the thermoplastic resin is a co-continuous phase, wherein the rubbery elastomer is a co- 30 continuous phase, and wherein the highly saturated elastomer is a co-continuous phase.

6. A thermoplastic elastomer composition as specified in claim 3 wherein the highly saturated elastomer is a continuous matrix phase, wherein the rubbery

elastomer is a dispersed phase, and wherein the thermoplastic resin is a dispersed phase.

7. A thermoplastic elastomer as specified in claim 3 wherein the rubbery elastomer is styrene-butadiene rubber.

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8. A thermoplastic elastomer as specified in claim 7 wherein the styrene-butadiene rubber has a bound styrene content of 10 to 40 weight percent.

9. A thermoplastic elastomer as specified in claim 8 wherein the styrene-butadiene rubber has a vinyl content which is within the range of 10 to 60 percent.

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10. A thermoplastic elastomer as specified in claim 3 wherein the rubbery elastomer is coupled with Sn or Si.

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11. A thermoplastic elastomer as specified in claim 3 wherein the rubbery elastomer is a hydrogenated nitrile rubber.

12. A thermoplastic elastomer as specified in claim 3 wherein the rubbery elastomer is crosslinked with a hydrosilation crosslinking agent.

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13. A thermoplastic elastomer composition as specified in claim 3 wherein the hydrosilation cure system is comprised of a hydrosilation agent and a hydrosilation catalyst.

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14. A thermoplastic elastomer composition as specified in claim 3 wherein the hydrosilation agent contains at least two silicon hydride (Si-H) groups per molecule and contains 0.003 to 2.0 weight percent of hydrogen bonded to silicon, and is selected from the group consisting of trimethylsiloxy terminated methylhydrosiloxane-dimethylsiloxane copolymers, hydride terminated polydimethylsiloxanes, hydride terminated methylhydrosiloxane-dimethylsiloxane copolymers, trimethylsiloxy terminated polymethylhydrosiloxanes, poly(dimethylhydrogensiloxy)silanes, tetrakis(dimethylsiloxy)silanes, polymethylcyclotetrasiloxanes and silicon hydrides of methylsiloxanes or polymethyldi- and polymethylsiloxanes.

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15. A thermoplastic elastomer composition as specified in claim 3 wherein the hydrosilation catalyst is selected from the group consisting of a platinum, platinum zero compounds complexed with compounds selected from carbon monoxide, fumarates, phosphines, divinyltetramethyldisiloxanes, tetravinyltetramethyldisiloxanes, palladium, chloroplatinic acid, platinum chloride complexes in alcohols, and rhodium, that is complexed with a member selected from divinyltetramethyldisiloxanes or polyvinylmethyldisiloxanes or cyclovinylnmethyldisiloxanes wherein additional divinylsiloxanes or polyvinylsiloxanes or polyvinylmethylcyclsiloxanes are present, wherein the catalyst or catalyst complexed compounds are incorporated on the block copolymer, crosslinkable elastomer, and/or oil, and are preferably present from about 0.0015 to about 1 parts metal by weight of the crosslinkable elastomer.

16. A thermoplastic elastomer composition of claim 3 wherein the hydrosilation agent is tetrakis (dimethylhydrogensiloxy)silane.

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17. A thermoplastic elastomer composition of claim 3 wherein the hydrosilation catalyst is a platinum zero compound that is complexed with carbon monoxide and polyvinylmethylcyclsiloxanes to give a platinum carbonyl complex in cyclic methylvinylsiloxanes.

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18. A thermoplastic elastomer composition of claim 3 wherein the rubbery elastomer is grafted with an anhydride or acid functionality and is crosslinked with an amino-silane crosslinking agent.

19. A thermoplastic elastomer composition of claim 3 wherein the rubbery elastomer is grafted with vinyl silane and the silane grafted elastomer is crosslinked with moisture, and optionally, the thermoplastic resin is grafted with vinyl silane, and the silane grafted thermoplastic resin is crosslinked with moisture.

20. A thermoplastic elastomer composition of claim 3 where the thermoplastic resin is linear-low density polyethylene.

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21. A thermoplastic elastomer overmoldable and adhesive composition comprising (a) a thermoplastic and functionalized polymer selected from the group consisting of a copolymers obtained by the hydrogenation of diene repeat units, olefinic resins, and styrene containing thermoplastic resins, wherein the said functional groups
5 are selected from the group consisting of acid anhydrides, acid chlorides, carboxylic acids, isocyanates, epoxides, amines, hydroxyls, and glycidyl acrylates, and glycidylor methacrylates, wherein the thermoplastic and functionalized polymer is present at a level of up to about 500 parts, (b) 100 parts of dynamically crosslinked rubbery elastomer that is comprised of repeat units derived from the conjugated diene monomers selected from
10 1,3-butadiene, isoprene, and vinyl aromatic monomers, wherein the elastomer is crosslinked in the presence of the thermoplastic polymer, and wherein the thermoplastic elastomer overmoldable and adhesive composition is void of an unfunctionalized polyolefin resins, and wherein the thermoplastic elastomer composition is void of non-elastomeric polyolefin resins comprised of at least one monomer selected from the group
15 consisting of butene, isobutylene, octene-1, 4-methyl pentene-1, ethylene, propylene, and hexene-1.

22. An article of manufacture that is comprised of a thermoplastic elastomer composition overmolded onto a hard substrate wherein the thermoplastic elastomer
20 composition is comprised of the thermoplastic elastomer composition as specified in claim 21.

23. An article of manufacture as specified in claim 22 wherein the hard substrate is selected from the group consisting of polypropylene, polyethylene,
25 polystyrene, polycarbonate, polybutylene terephthalate, nylon-6, nylon-11, nylon-12, nylon-6,10, acrylonitrile-butadiene-styrene copolymers, styrene-acrylonitrile copolymers, polyacetal, and metals.

24. A process for manufacturing an article of manufacture that comprises (1)
30 preparing thermoplastic elastomer composition overmolded onto a hard substrate wherein the thermoplastic elastomer overmoldable and adhesive composition is comprised of the thermoplastic elastomer composition as specified in claim 21.